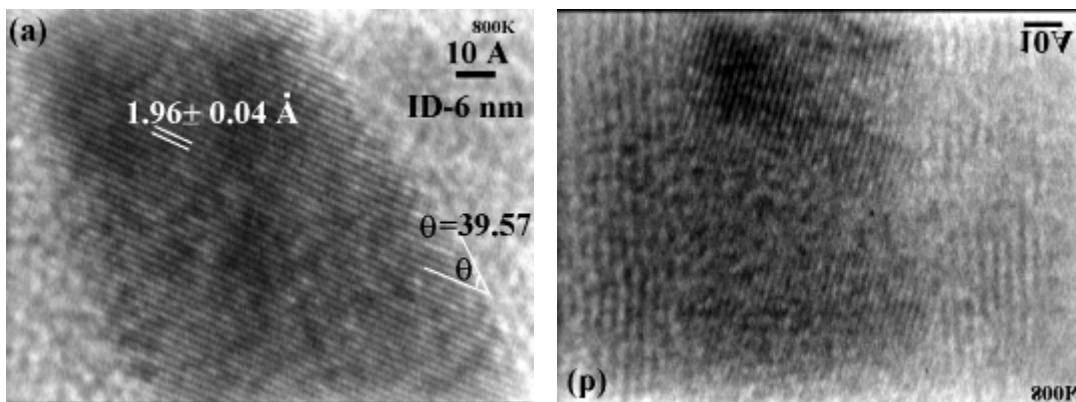


Irradiation effects of 100 MeV Au⁺ ions on multiwalled carbon nanotubes and encapsulated single crystal nickel nanorods

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Abstract

Carbon nanotubes of multiwalled and single walled variety have caught the imagination of the scientists and technologists the world over. These interesting new materials are formed with the rolled graphite planes as the building blocks [1]. The nanotubes show a variety of interesting mechanical and electrical properties [2,3]. One interesting aspect of the nanotube growth is the roll of the catalyst. Nickel, cobalt, iron and several other metallic systems have been used as catalyst. In many cases, the catalyst gets filled inside the tubes enabling one to get the interesting phases of the encapsulated particles. In our case we have intentionally used a thick layer of nickel as catalyst to fabricate the nickel nanorods. In the present abstract we report the results of the irradiation of the multiwalled carbon nanotubes samples with gold ions of 100 MeV and studied the damage on the tube walls and the encapsulated Ni fillings inside using high-resolution transmission electron microscopy (HRTEM). As the nanotubes in our case are of 10-20 nm diameter, it is expected that the interaction with the tubes will be via electronic energy loss $(dE/dx)_e$ of the ion beam. The results on the damage of the tube walls, nature of the generated defects and the nickel nanorods inside the tubes will be reported. Figure 1 shows the HRTEM images of the Unirradiated and irradiated Ni filled carbon nanotubes.



References

1. S. Iijima, Nature 354 (1991) 56
2. J.W.G. Wildoer, L.C. Venema, A.G. Rinzler, R.E. Smalley, C. Dekker, Nature 391 (1998) 59
3. T. W. Odom, J.L. Huang, P. Kim, C.M. Lieber, Nature 391 (1998) 62